4-1-1972

A Synthetic Estimate of the National Wealth of Japan, 1880-1970

Raymond Goldsmith

ECONOMIC GROWTH CENTER

YALE UNIVERSITY

Box 1987, Yale Station
New Haven, Conn. 06520

CENTER DISCUSSION PAPER NO. 143

A SYNTHETIC ESTIMATE OF THE NATIONAL WEALTH OF JAPAN, 1885–1970

Raymond W. Goldsmith

April 20, 1972

TABLE OF CONTENTS

Note to Readers

This paper, intended as an appendix to an essay on the financial development of Japan during the last century, I should not have had to write, and I hope that Japanese economists will regard it as a challenge to do better. However, an estimate of national wealth is essential for the construction of a national balance sheet, and national balance sheets in turn form the statistical core of my approach to the analysis of financial structure and development. I therefore had no choice but to do the best I could, being hampered by limitations of time, scarcity of previous work in the field and, most seriously, ignorance of the Japanese language.

The present version should be regarded as a first draft and comments, criticism and concrete suggestions for improvement of the estimates will be welcome.

4/20/72 R.W.G.

A Synthetic Estimate of the National Wealth of Japan, 1885-1970

I. Methods of Estimation

This estimate has been put together not for its own sake, but as a part of an estimate of the national balance sheet of Japan. This may excuse the fact that more liberties have been taken with the data and more short-cuts in the estimates have been accepted than might be regarded as permissible if an estimate of national wealth was the primary objective.

There are essentially two approaches to the estimation of Japan's national wealth during the past century. The first is to string together the official and semi-official estimates in current prices that are available for total national wealth for eight benchmark dates between 1905 and 1935, and the figures for reproducible, tangible assets based on the extensive surveys of the Economic Planning Agency for 1955, 1960, 1965 and (not yet available) for 1970. The alternative is the use of the annual estimates, in 1934-36 prices, of reproducible fixed assets developed by Ohkawa and associates for 1874 to 1940 using the perpetual inventory method. Neither of these two approaches provides a single set of estimates that extends over the entire period; covers all components of national wealth; is expressed in current prices as is required for financial analysis; and is reasonably comparable over the entire period of nearly one hundred years.

If strict standards are applied, the development of such a comprehensive and comparable set of estimates for the last century is as yet, and possibly for ever, beyond reach. It appears, however, that by combining existing estimates and filling in gaps in them--some undoubtedly of great importance--a series can be developed for a substantial number of benchmark dates between 1885 and 1970 that reflects trend and structural changes with

sufficient accuracy to serve as a component in a set of national balance sheets, a set to be used as the basis of an analysis of the development of Japan's financial superstructure and of its relation to the country's real infrastructure of national income and wealth; and it is this analysis which is the objective of the exercise.

This set has, briefly, been developed by combining (a) Ohkawa's perpetual inventory estimates of reproducible fixed assets for the period from 1885 to 1940, converting the original constant (1934/36) price estimates into current price figures by Ohkawa's price indices, and Economic Planning Agency figures for the postwar period; with (b) estimates of the other components of national wealth (land; inventories; consumer durables; net foreign assets), taken for the pre-war period chiefly from census-type data; and derived for the post-war period from miscellaneous, partly official sources --in the case of non-agricultural land admittedly by hazardous methods and with a wide margin of error.

The derivation of this set of estimates is described in summary form in the following pages and in the footnotes to Tables 3 to 12. The second section of this paper very briefly presents some of the results, and relates in elementary form the stock estimates of national wealth derived here to the flow of magnitude of national product.

1. Land

Of the important components of national wealth the difficulties of estimation and the errors in the resulting figures are greatest for land, particularly before the first census-type estimates of 1905; and here in particular for non-agricultural land.

a) Agricultural Land: Separate figures for agricultural land are apparently given in only three of the series of official or semi-official

national wealth estimates available at intervals of six years or less for the period 1905-1935[1], viz. 1910 (5.5 bill. yen) 1924 (16.9 bill. yen) and 1930 (16.2 bill. yen). In addition an unofficial detailed estimate, apparently based on official (Ministry of Finance) materials was made for 1904 by Igarashi and Takahashi (The National Wealth of Japan, 1906). This book provides estimates for the value of paddy and dry fields in each prefecture, which total 9.3 billion yen for Japan as a whole, an estimate difficult to accept as it is considerably higher than another unofficial, estimate for about 1907[2] and than the Bank of Japan's estimate for 1910.

There is also available a price average of an unknown degree of representativeness for the two main types of agricultural land (paddy and dry fields) which extends without break on an annual basis from 1913 to the present. This average can be combined with the known area of agricultural land to furnish an independent estimate, shown in Table 4, of the value of these two types of fields which account for the bulk of the value of agricultural land. Unfortunately there are considerable differences in level and movement between benchmark dates between the census type figures and the index.

A choice, therefore, must be made. It has led to accepting from 1920 on the census value for 1930 and using the index derived from the multiplication of price and area data as extrapolator. One reason for this decision is the fact that "special care was exercised in working out the values of paddy fields, truck farms, residential (i.e. all urban) land and dwellings"[3]; another that the estimates for the end of the period are reasonably close to the results of a different approach, viz. the use of average price of farm land changing hands. In the fiscal year 1969-70 this price averaged 237 yen per m^2 for 135 bill. m^2 of taxable land changing hands which represents about 2.7 percent of all farm land.[4] On that basis the value of all farm land late

in 1969 would be slightly below 12 trillion (10^{12}) yen, only a little less than the calculated value for 1970 of Table 3.[5]

Difficulties are more formidable still for the period before 1910. There is no comprehensive estimate and the available scattered data on agricultural land prices are contradictory.[6] There seems to be little doubt, however, that land prices were much lower in the first two or three decades of the Meiji era than during the 20th century; that they fell sharply during the Matsukata deflation of the early 1880's; and that they recovered only slowly for at least another decade. The estimates adopted and shown in Table 3 are the result of a, hopefully judicious, choice among the available primary data, assuming, not without some supporting evidence, that market values of agricultural land were in the late 1880's close to assessed values.[7] Only an intensive study of all available material, mostly available in Japanese only and therefore inaccessible to me, will lead to the establishment of figures in which a reasonable amount of trust can be put.[8]

b) Forest Land: In the official or semi-official Japanese national wealth estimates forest land (sometimes also listed as "forestry" or "trees") appears at relatively high values. In the census type estimate of the Bank of Japan for 1910, for example, the figure for forests is almost as high as that for agricultural land; even in 1924 it is half as large. The movement of these figures, however, is erratic, and it is doubtful whether much faith can be put in them.

From 1955 on--no census type figure exist after 1935--it is possible to estimate the value of forest land by multiplying the forest area with the reported average price, a calculation illustrated in Table 5. The resulting estimates for forest land, rising from about two trillion yen in 1955 to about 8 trillion in 1970, are equal to nearly one-half of the estimated value of farm land in 1955 and to nearly two-thirds in 1970, ratios somewhat higher

than the apparent relationship before 1935.

An alternative source--the figures on the value of national forests in the central government's patrimonial accounts[9]--had to be discarded as they appear to be conventional, are substantially changed only at long intervals and obviously lag considerably behind market values.

c) Non-agricultural Land: This is the most difficult component of national wealth to estimate. Because of its large size and because of the wide margin of the uncertainty necessarily connected with any estimate that can now be made, the error in this component considerably influences the estimates for total land values and even that for total national wealth as well as some of the most important structural relationships in the analysis of national wealth. Unfortunately no set of estimates satisfying even moderate requirements of accuracy and consistency can be prepared, if at all, without extensive analysis of all the materials available, often only in Japanese, and without the collection of new primary data. In this situation the most that the estimates presented--which are essential to any estimate of total national wealth--can claim is to provide an indication of the order of magnitude involved.

There are four census-type, i.e., comprehensive, estimates for the value of all non-agricultural private land, although the exact definitions are not too clear and probably are not exactly comparable.[10] These estimates--for 1904, 1910, 1924 and 1930--are shown in Col. 1 of Table 6. No comparable estimate has been made for the last forty years. Unfortunately, it is difficult, if not impossible, to accept all four estimates and to treat them as belonging to one time series if collateral information on non-agricultural land prices, areas, construction costs and land/structure ratios is taken into account. It is, therefore, necessary to supplement, and possibly adjust, the census-type estimates by figures derived by different methods.

Three methods of estimation are available for those benchmark years for which no specific census type estimates exist. The first is the interpolation and extrapolation beyond 1930 of the census type estimates with the help of indices of non-agricultural land prices and areas. The second, related, method is the multiplication of the absolute values for prices and areas for non-agricultural land. The third method is fairly independent, obtaining the value of urban land by multiplying the structure value of buildings with estimates, usually made by real estate experts, of typical land/structure ratios. The results of the three methods unfortunately diverge widely, though more in level than in movement.

The first method starts from the only four census type figures available and tries to derive from them an estimate for the value of non-agricultural land for 1936, the year with which the urban land price index starts. That estimate, unfortunately depends on whether one starts with the census type figures for 1904, 1910, 1924 or 1930, and what assumptions one makes about the trend of urban land prices before 1936, the data on non-agricultural, or urban, areas being less uncertain.

The only census type estimate that permits a direct comparison with urban land prices of 1936 is that for 1904. It points to an increase from 1904 to 1936 by about 240 percent, which is not unreasonable in view of the increase in building costs by about 120 percent,[11] and the usual tendency of the rise in land values to exceed that in building costs. This would yield an estimate of total non-agricultural land values in 1936 of about 8 billion yen, allowing for the increase in urban areas by nearly 20 percent. The census-type estimate leads to a slightly higher estimate--in the order of 10 billion yen.

The difficulty in using the 1924 and 1930 census estimates is that there is no information on the trend of urban land prices in the period 1924

to 1936, and it is dangerous to assume that land prices moved parallel to building costs, leaving the land/structure ratio unchanged. What is worse, the 1930 census estimate is about six times as high as that of 1910 although building costs appear to have increased by only about 70 percent and the urban area expanded by not much more than 5 percent (difficult to believe), implying a sharp increase in the land/structure ratio. The 1930 figure is also difficult to reconcile with that for 1924, being one-third larger in the face of a reported decline in building costs by about one-third and a very small increase in urban area. Thus adjusting the 1924 estimate for changes in building costs and urban area one obtains an estimate for private non-agricultural land in 1936 of about 9 billion yen, while the same procedure yields an estimate of about 18 billion yen if one starts from the 1930 census-type figures.

Between 1936 and 1970 the urban land price index has risen almost 4,600 times while the urban area has expanded by a little over one-third (Table 6). Thus the value of private non-agricultural land in 1970 should be, if the land price index is accepted, about 6,200 times what it was in 1936, i.e., if one starts from the 1904 census-type figure, about 50 trillion (10^{12}) yen; about 62 trillion if the multiplication is based on the 1910 benchmark; and about 55 and 112 trillion yen if the calculation uses the 1924 or 1930 census-type values and accepts a land price rise in line with construction cost movements between 1924 and 1930 and 1936. While the first three figures can be reconciled for 1970 with the results of Method III, that based on the 1930 census-type benchmark seems to be unacceptably high.

The estimates derived by this method for 1960 and 1965 yielding land/structure ratios of 1.36 and 1.15 however, are undoubtedly too high and move in the wrong direction. The estimate for 1955 (0.66) also seems too high, although the fact that it lies substantially below the values for the

following three benchmark dates is in accord with other evidence, particularly the movement of land prices and construction costs.

The figures obtained by the multiplication of the available data (collected, though not published, by the Japan Real Estate Institute) on absolute prices and of areas, on the other hand, seem unreasonably high (higher even than the estimate based on the 1930 census figures)--possibly because the price data refer to a narrower concept of non-agricultural area than the area statistics, or because I have misinterpreted them--and have been discarded.

The difficulty with the third method is that apparently only one independent estimate of the land/structure ratio of urban building has been published for recent years, which, moreover is limited to residential structures. This estimate can be derived from a survey undertaken in 1963 by the Mitsubishi Economic Research Institute which indicates a land/structure ratio of 0.72.[12] Taking into account the much more rapid rise in residential land prices than in residential construction cost the 1970 ratio would on that basis be a little above unity, and this in accord with the estimate derived from the land price and area indices.[13]

The only earlier set of estimates permitting the derivation of a land/structure ratio is that of Igarashi and Takahashi for 1904.[14] The value (0.39) is not unreasonable in view of the much more rapid rise in land prices compared to construction costs in the postwar period. It implies a rise by about 240 percent of urban land prices between 1904 and 1936 compared to a rise in construction costs of 135 percent and of the price level (gross national expenditure deflator) of 90 percent.

A lower boundary for the land/structure ratio of non-residential buildings can be obtained from the estimated combined balance sheet of all

non-financial corporations.[15] If the book value of land shown there is related to the book value of structures,[16] the land/structure ratio has risen from 15 percent in 1960 to 28 percent in 1965 and to 35 percent in 1968. Because the valuation at original cost tends to understate the market value of land much more than that of buildings and structures, these ratios may be regarded as minima. The correct ratios are undoubtedly higher, probably considerably so. The extent of the difference between the book and the market land/structure ratios may, however, have declined over the period.[17]

Weighing the fragmentary information on land/structure ratios one may possibly conclude that in 1970 it was in the neighborhood of unity for the country as a whole and for all types of non-agricultural land taken together, the higher values for residential and commercial land in large cities offsetting the lower values for industrial land and for residential and commercial land in the rest of the country. But this cannot be more than a personal judgement. There can be no doubt, on the other hand, that whatever the value of the land/structure ratio in 1970, it must have been progressively and sharply lower as we go back towards 1950. It also must have been considerably lower than in 1970 during the entire pre-war period, but whether there were marked and consistent trends between 1900 and 1936 we cannot say.

If we accept an estimate of non-agricultural land values for 1970 based on a land/structure ratio of unity, which after all seems to be the least objectionable method, and also accept the validity of the urban price index and the change in urban area, we obtain a back-cast estimate for 1936 of about 9 billion yen. Since this supposedly includes public urban land, private land values might have been in the neighborhood of 8 billion yen. This is compatible with the extrapolated values for that year based on the 1904, 1910 and 1924 census types, though not with that based on 1930--if urban land prices are assumed to have moved parallel to building costs

from 1924 to 1936. If they are supposed to have outrun building costs, as is not at all unlikely, the back-cast estimate for 1936 is considerably below extrapolations based on the 1904, 1910 and 1924 estimates as well.

As one does not want to reject a contemporary respectable estimate without very good reason there seems no way out from accepting the 1904, 1910 and 1924 census-type estimates (with only small upward adjustments to allow for public urban land) and to abandon only the 1930 estimate,[18] substituting for it one more in line with the 1924 estimate, and to accept for 1936 a figure somewhat above the 1930 back-cast estimate and more in line with the 1924 figure, viz about 10 billion yen.

Even if we thus basically accept as the least objectionable compromise, the 1904, 1910 and 1924 census-type estimates and the 1970 figure based on a land/structure ratio of unity it is not possible to derive estimates for the other benchmark dates by one single method. These estimates rather have to be judgemental, interpolating between benchmark dates on the basis of construction cost indices, land price indices and land/structure ratios, the latter being in turn judgemental. This is how the figures in col. 8 of Table 6 have been derived--and may the Lord have mercy on the estimator's soul.

2. Reproducible Fixed Assets

For this, the most important single component of national wealth there are fortunately available for the entire period estimates whose method of derivation is known, that are reasonably comparable, and that are designed to fit into a system of social accounts. Up to World War II, Ohkawa's series[19] derived by cumulation of net capital formation, in constant (1934-36 prices) is undoubtedly preferable to the census-type estimates that vary in method and reliability and are not easily comparable over time,

notwithstanding the well known problems created by the difficulty of adjusting the original constant price estimates to reflect the current price level of structures and equipment. The mostly official estimates for the post-war period, which are based on special enquiries rather than derived by the perpetual inventory method, seem to be consistent with the national accounts figures for net capital formation.

While, as Table 9 shows, the two sets of estimates for total fixed reproducible assets are reasonably close for the benchmark dates of 1905, 1910, 1913, 1930 and 1935 (the differences are, taking the perpetual inventory figures as basis of comparison, +0, +4, -18, +19 and +18), there are wide and erratic differences in the components. These, together with the large differences in totals and in components in 1919 (not shown) and 1924 and the obviously non-sensical nature of level or movements of some of the census-type figures (e.g. 1919 level, and movements of equipment and non-residential structure estimates for 1905 to 1913) should suffice to rule out the census-type figure as the basis of any serious analysis.

In the post-war period official detailed estimates, prepared by the Economic Planning Agency, are available for 1955 and 1960 and have been accepted.[20] A similar estimate is available for 1965[21], but since it is limited to business type reproducible assets--constituting in 1960 60 percent of the national total-- rough extrapolation for dwellings and general government fixed tangible assets had to be made, starting from figures on gross capital expenditures and on change in the relevant implicit deflators in the national accounts. The 1970 estimate finally was derived from the Economic Planning Agency figure for 1968[22] by extrapolation, based again on the data on capital expenditures and capital goods prices in the national accounts. These estimates will have to be revised when the results of the official estimate for all sectors' reproducible assets in 1970 become available in 1973 or 1974.

3. Inventories

For the period from 1913 to 1935 there is, in the absence of any serious study of the matter, apparently no alternative to using the figures in the census-type estimates, even though some of these are suspect. The comparison of the series with the better founded estimates for the stock of reproducible fixed assets excluding residential structures or national income presented in Table 10, however gives no reason to disqualify any of them, except possibly that for 1920 which seems too low.

4. Consumer Durables

Here chaos reigns. The original census type estimates put "furniture" at 10 to 50 percent of fixed reproducible assets--excessive ratios on the basis of the situation in other countries--while in the revised figures the ratio is reduced to about 1 percent from 1905 to 1913 and to 4-5 percent from 1919 to 1935.[23] It, therefore, seems preferable to derive the figures from data on expenditures on consumer durables. On the basis of Ohkawas figure on expenditures on "furniture and utensils" their stock may be estimated, assuming ten year life and straight-line depreciation at less than 100 million yen for 1900, fully 200 million yen for 1913 and to over 1200 million yen for 1930, equivalent to about 1, 2 and 4 percent of the value of fixed reproducible assets at these dates. The figures in Table 11 are based on these ratios.

In the post-war periods expenditures on consumer durables are shown separately in the national accounts, and the stock has been calculated on that basis using now a shorter life of eight years, but retaining straight line depreciation. This yields an estimate of the value of the stock at the end of 1970 of about 8-2/1 trillion yen or 7 percent of reproducible fixed assets, about twice the 1930 and four times the 1913 ratio.

5. Net Foreign Assets

Here two methods are available, first benchmark census-type estimates; and second, the equivalent of the perpetual inventory figures, the cumulation of balance of payments surpluses and deficits. The available data are compared in Table 12, which shows that the two series, unfortunately, sometimes diverge considerably in the extent though generally not in the direction of the movement. Fortunately net foreign assets are quite small compared to domestic tangible wealth from World War I to the later 1960's so that even a substantial error cannot seriously affect the estimate of total national wealth.

II. Some Results

This summary and discussion of the results will be limited to two aspects of national wealth in which current rather than constant values are appropriate, the distribution of national wealth among the main types of tangible assets and the relationship between national wealth and national product.

1. The Structure of National Wealth

The distribution of total national wealth among the main types of tangible assets is shown for half a dozen benchmark dates between 1885 and 1970 in Table 13. Because of the roughness of many of the figures only substantial and protracted changes should be regarded as significant and worthy of notice.

The main structural change, of course, is the declining trend in the share of land. While land constituted nearly one-half of total national wealth in 1885 and 1900 and still more than two-fifths between 1913 and 1930, its share then declined sharply to a low of one-fourth in 1950. The share recovered rapidly to a level of about one-third from 1955 to 1970,

reflecting the extraordinary large rises in land prices in the post-war period.

These movements in the share of land are the result of quite different trends in the share of urban (residential, commercial and industrial) land and of other (farm and forest) land. Over the period as a whole the share of farm and forest land has declined sharply from fully one-third to less than one-tenth, although remaining without much change at a level of slightly below one-third between 1900 and 1930. The decline of the share from the 1930's on is due both to a reduction of the importance of agriculture in the Japanese economy and to the relatively slow rise in farm land prices during the 1960's. Urban land, on the other hand, showed no trend up to the late 1950's, holding very close to 13 percent of total national wealth. The extraordinary rise in urban land prices in the post-war period, particularly the 1960's, sharply increased its share to one-fourth of total national wealth in 1970 (and this may well be an understatement).

An equally diverse trend can be observed among the main components of reproducible tangible wealth which constituted from 52 to 60 percent of total national wealth until 1930, but increased its share to about two-thirds of the total in the post-war period reflecting mainly the process of industrialization and urbanization of Japan. The movement is even more pronounced if livestock is eliminated in which case the share of reproducible tangible assets rises from slightly less than one-half from 1885 to 1930 to nearly two-thirds after World War II. There was also an irregular decline in the share of residential buildings from about one-fifth of national wealth in the late 19th century to an average of only about one-tenth from 1955 to 1970, a movement which reflects the relative neglect of housing in the Japanese economy and the resulting low standard of accomodation compared to the level which the rest of the economy has reached. The share of inventories

fails to show a definite trend--the average for the eleven benchmark dates is close to one-tenth of national wealth--the irregularity of the movement possibly reflecting the poor quality of the figures before 1955.

The increases are therefore concentrated in the shares of non-residential buildings and structures and in producer and consumer durables. These three components of wealth increased their share from fully one-fifth of national wealth in 1885 and 1900 to nearly 30 percent in 1930. Their main advance, however, began in the 1930's raising their share to approximately two-fifths of total national wealth from 1950 to 1960 and to about 45 percent in 1965 and 1970. Among these three components producer and consumer durables together have doubled their share from about five percent of total national wealth and one-tenth of reproducible tangible assets in 1885 and 1900 to one-tenth of national wealth and one-fifth of reproducible tangible assets, in 1930. Further significant increases occurred in the post-war period which lifted the share of durables close to one-fifth of national wealth and to nearly 30 percent of reproducible tangible assets in 1970. It is, of course, these two categories of national wealth which most clearly reflect the industrialization and mechanization of an economy.

2. The Aggregate Capital-Output Ratio

Estimates of national wealth in current prices, of course, do not lend themselves to the calculation of marginal capital-output ratios which, correctly expressed in constant prices, are needed in studying production functions and similar relationships. They are, however, useful in measuring and interpreting the relationship between the flow of national product and the stock of tangible assets that cooperate with labor and other factors in producing that income. The relevant figures are shown in Tables 14 and 15.

The broadest, but for economic analysis least useful ratio, is the relation between total national wealth (land, reproducible tangible assets and net foreign assets) to gross national product.[24] This ratio shows a downward trend from 1885 to 1940, declining irregularly from 6.0 to 4.3. A break occurs, as in many other countries, during the 1940's. As a result, the broad capital-output ratio has been only slightly in excess of 3 since the mid-1950's showing only a very weak and irregular upward movement. The extraordinarily low value of the ratio in 1950 of 2.4 is not significant, because this date falls in the middle of the recovery period from the destruction and disorganization accompanying and following Japan's participation in World War II.

If land is disregarded the ratio between reproducible tangible assets and national product shows an unexpected decline between 1885 and 1913, a period during which the industrialization of Japan made considerable progress. This is due largely to a sharp reduction in the ratio of residential building to national product which reflects the secular lag of the housing sector behind overall economic growth. The break accompanying World War II is visible also in this series since the ratio averaged 2.8 from 1913 to 1940 without definite movements, while it averages 2.1 during the post-war period, this time showing an upward trend from 1.8 to 2.2.

Within the ratio, however, some significant changes can be discerned. The ratio of the value of residential structures to gross national product is sharply lower for the post-war period with only approximately one-third of a year's national product compared to an average of a full year's national product from 1885 to 1920 and one of about three-fifths of it in 1930 and 1940.

The narrow aggregate capital-output ratio (non-residential buildings and structures, producers and consumer durables and inventories including

livestock, divided by gross national product) shows no definite trend over the period (and increases by one half between 1950 and 1970) in contrast to the declines in the broad and the intermediate ratios partly because of the decline in the ratio for residential buildings. That the values of the narrow ratio are lower in the post-war period than they were before 1940 is in part due to the inclusion of government buildings and structures. If these are eliminated, the post-war ratio exhibits a more pronounced upward trend than is shown in Table 15, and is closer to the 1900-1940 levels, the difference reflecting relative neglect of some sectors of the economy's infrastructure in the post-war period. (Between 1955 and 1970 the value of reproducible tangibles of the public sector increased by about 650 percent compared to a rise by nearly 1000 percent in the non-financial corporate sector.)

The ratio of the share of producer durables rose sharply in the post-war period, and by 1920 had almost recovered the 1920 and 1940 levels. Consumer durables are at a considerably higher level in relation to national product in the post-war period than before 1940, but in 1970 they still did not represent more than six weeks national product.

Net foreign assets have at all benchmark dates been of only secondary importance in the overall picture. Up to World War I, when Japan was still a net international borrower, the ratio of net foreign assets to national product was negative to the extent of one to over three months' gross national product. The maximum positive ratio up to 1970 also was not much in excess of a quarter's gross national product, values reached in 1920 and 1970, but certain to be exceeded during the 1970's.

It should be borne in mind that these movements, as those of all capital-output ratios expressed in current prices, are influenced by changes in price relationships, particularly the relationship between asset prices (represented in the case of reproducible capital assets by the current costs

of construction and of equipment) and the general price level which is dominated by consumer goods prices. Such changes do not seem to have been of great importance before 1930 as the indices of consumer goods and investment goods prices show similar movements--only, however, because the prices of producer durables rose less while construction costs advanced more than the prices of consumer goods--and the relatively small rise in farm land prices appears to have been compensated by a rise in urban land prices well in excess of that in the price level of current output. Between 1930 and 1945, however, these broad relationships changed considerably, investment goods prices rising much more than the prices of consumer goods, (because of a very sharp rise in construction costs) and land prices lagging behind both. In the post-war period investment good prices, particularly construction costs, continued to rise considerably more than the prices of consumer goods, but now land prices, and here particularly the price of urban land, moved far ahead of the prices of all types of current output. For the entire period of nearly a century the relationship between investment and consumer goods prices did not change sharply--if the available indices can be trusted--although construction costs rose considerably more than the prices of producer and consumer durables, particularly if change in quality could be taken into account adequately, while land prices rose several times as fast as the prices of commodities and services. Hence if the usual methods of deflation were used, the capital-output ratios excluding land would not be severely affected in the very long run--though they would be over shorter periods--, while the broadest capital-output ratio would decline even more than it does if based on current prices. However, the trend in the ratio of structures and durables to national product would be considerably changed in favor of the latter. In constant terms the ratio of the share of durables to national product would very likely be considerably higher in the 1960's, than before World War II.

Footnotes

[1]See Bank of Japan Hundred Year Statistics, pp. 20/23 and Supplement, pp. 13, 15.

[2]T. Sako in Fifty Years of New Japan, (1910) Vol. I, p. 577.

[3]S. Shiomi, Kyoto Economic Review, IX (1934), p. 29.

[4]Economic Planning Agency, Economic Survey of Japan (1970-71), p. 256 of Japanese text.

[5]In the OECD's report on Capital and Finance in Agriculture, Vol. II (p. 18 of country report on Japan) the volume of agricultural land sales is given at 111 bill. yen for 1967 and it is stated that about 0.8% of arable land changes hands annually. These figures imply a value of all arable land of nearly 14 trillion yen. This rough estimate is again not too far from the two other figures.

[6]For a review see Supplement to Hundred Year Statistics pp. 60/62.

[7]This is Rathgen's conclusion (Japan's Volkswirtschaft und Staatshaushalt, 1891, p. 258 ff) after an intensive discussion of the data available; cf, also the table p. 767.

[8]After completing this preliminary version of the estimates I discovered a set of figures for a few benchmark dates between 1880 and 1960 developed by two much more knowledgeable agricultural economists, partly from the same basic data used here. Their estimate of the value of arable land is compared below with those of Table 3 (billion yen through 1940; trillion yen for 1960).

	Hayami and Ruttan[1] (1)	This essay (2)	Difference (1) - (2) / (1) (3)
1880	1.63	1.30[2]	+.20
1900	4.77	4.00	+.16
1920	23.29	22.70	+.03
1940	28.82	27.00	+.06
1960	8.59	6.84	+.20

[1]Y. Hayami and V. Ruttan in Journal of Political Economy, 78 (1970), p. 1117.

[2]1885.

The comparison shows that Hayami and Ruttan's estimates are on the average 13 percent higher than those of this essay, the difference ranging from 3 to 20 percent. However, the excess of their figure for 1880 and this essay's estimate for 1885 can easily be accounted for by the undoubtedly downward trend in farm land prices during the Matsukata deflation, leaving substantial differences only for 1900 and 1960. The long-term movements in both series are practically the same.

[9] See Hundred Year Statistics, pp. 160-61 and Japan Statistical Yearbook, 1970, pp. 486-87.

[10] An example will give an idea of the difficulties of a researcher not fully familiar with the Japanese language, or of the inadequacies of translation. In all English language (or bi-lingual) sources the Japanese term "takuchi" is translated as "residential" (sc. land). The correct meaning of the term, however, is significantly different, including also commercial and industrial sites (cf. J. Nakamura, Agricultural Production and the Economic Development of Japan 1873-1922, p. 34), thus being identical with or close to all non-agricultural (and non-forest) land.

[11] Ohkawa and associates, Estimates of Long-term Economic Statistics of Japan, Vol. 8, pp. 158/59.

[12] Economic Survey of Japan (1970-1971) p. 139. There is no description of the method of derivation of either this or estimates cited in footnote 4 in this source. (The Japanese edition of this publication apparently provides some further information in the Appendix.)

[13] The figures in The Economic Development of Japan, 1970/71 that apparently permit the derivation of a land/structure ratio for residential buildings actually do not do so because the figures for land cost do not include land already owned by builders or homeowners when beginning construction.

[14] The National Wealth of Japan, 1906.

[15] Japanese Statistical Yearbook, 1969, pp. 312/13.

[16] It has been assumed on the basis of the comprehensive national wealth estimate of 1960 that buildings and structures represent 55% of the total value of all fixed reproducible assets.

[17] For 646 nonfinancial corporations listed in the Tokyo Stock Exchange the market value of land in 1967 was estimated by Waho Shoken, a securities company, at more than eight times the book value. While the ratio is probably smaller for the bulk of nonfinancial corporations, this piece of evidence points to a very substantial understatement of land values in corporate balance sheets and hence to a considerably higher land/structure ratio than derived from the balance sheets. (I owe this reference to Professor Kimizuka.)

[18] This is a difficult decision in view of the statement that "special care was exercised in working out the values of paddy fields, truck farms, residential land [including commercial and industrial land] and dwellings. . ." in the 1930 census type estimate (S. Shiomi, Kyoto Economic Review, IX, 1934, p. 29), but it cannot be avoided unless most other evidence is discarded.

[19]Ohkawa and Associates, Estimates of Long-term Economic Statistics of Japan, Vol. 3, p. 134 for capital stock in 1934-36 prices and Vol. 8, pp. 158-59 and 165 for price indices.

[20]Economic Statistics Annual, 1970, pp. 277/280.

[21]Op. cit., p. 281

[22]Economic Survey of Japan (1969-1970)

[23]Supplement to Hundred Year Statistics, p. 15

[24]Since national wealth includes consumer durables as well as structures and equipment owned by the general government, the figure for gross national product used as divisor should conceptually include allowances for the use value of these items. Figures which meet this requirement for Japan are not available, but the difference would be rather negligible and certainly would not influence trends, except possibly during the last decade. Purists could also demand to use as divisor not the year's national product, but its rate at the end of the year, which would have to be approximated by the average of the current and following year's national product or better, but not usually feasible, the average of the fourth quarter of the current and the first quarter of the following year. When national product in current prices increases as rapidly as it has done in Japan--sometimes for an average of as much as 10 per cent a year for protracted periods--use of current year's national product may overstate capital-output ratios by 5 per cent judged by if the stricter standard is applied.

LIST OF TABLES

Table 1

Estimate of National Wealth of Japan, 1885-1970

bill. yen

	Land (1)	Reproducible tangible assets (2)	Net foreign assets (3)	Total (4)
1885	2.3	2.7	-0.2	4.8
1900	7.1	8.2	-0.2	15.1
1913	11.0	15.1	-1.0	25.1
1920	39.5	47.7	4.0	91.0
1930	31.9	37.6	1.7	71.2
1940	60.2	114.2	1.0	175.4
1950	2255	7100	.	9355
1955	9792	16564	199	26555
1960	16953	31630	370	48953
1965	34767	72410	-405	106772
1970	79450	162000	2070	243520

Sources

Col. 1 Table 2, Col. 4
Col. 2 Table 7, Col. 4
Col. 3 Table 12

Table 2

Estimate of Value of Land, 1885-1970

bill. yen

	Fields (1)	Forest land (2)	Nonagri-cultural land (3)	Total[1] (4)
1885	1.30	0.40	0.62	2.32
1900	4.00	1.00	2.10	7.10
1904	4.50	1.14	2.20	7.84
1913	6.00	1.76	3.27	11.03
1920	22.70	4.53	12.30	39.53
1930	16.20	6.71	9.00	31.91
1940	27.00	10.45	22.76	60.21
1950	1005	450	800	2255
1955	4682	2083	3027	9792
1960	6836	3412	6705	16953
1965	8260	4832	21675	34767
1970	12850	8100	58500	79450

[1] Does not include government non-forest and a few minor categories of land

Sources:

Col. 1 Table 3, Col. 3

Col. 2 Table 5, Cols. 3 and 4

Col. 3 Table 6, Col. 8

Table 3

Estimate of Value of Agricultural Land

	Fields		
	Census Value (bill. yen) (1)	Fields Value Index (1930=100) (2)	Estimated Value (bill. yen) (3)
1885		0.08	1.30
1900		0.45	4.00
1905		0.49	4.50
1913	5.45[1]	0.67	6.00
1920		1.40	22.70
1924	16.93	1.36	22.03
1930	16.20	1.00	16.20
1940		1.69	27.00
1950		62	1005
1955		289	4682
1960		422	6836
1965		510	8262
1970		793	12847.

[1] 1910

Sources:

Col. 1 — 1910 Bank of Japan, (Hundred Year Statistics, p. 22).

1924 K. Mori, The Estimate of the National Wealth of Japan Proper (International Statistical Institute) XIXth Session, p. 19.

1930 Nasu, Aspects of Japanese Agriculture, p. 15.

Col. 2 — From Table 4, Col. 8

Col. 3 — Col. 2 multiplied by 16.20 bill. yen (except 1900 to 1913 which are rough estimates).

1885-1913 - Rough estimates (1913 based on Col. 1.)

Table 4

Derivation of Index of Value of Private Agricultural Land, 1885-1970

	Paddy Fields			Ordinary Fields			All fields	Index 1930 = 100
	Area mill. ha	Price[1] 000 yen per ha	Value bill yen	Area mill. ha	Price[1] 000 yen per ha	Value billion yen	billion yen	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1885	(2.66)	0.50	1.3	2.05	0.15	0.3	1.6	0.08
1900	2.76	1.80	5.0	2.79	1.40	3.9	8.9	0.45
1904	(2.80)	1.95	5.5	(2.75)	1.57	4.3	9.8	0.49
1913	(2.90)	3.01	8.7	(2.80)	1.63	4.6	13.3	0.67
1920	3.01	5.94	17.9	3.02	3.29	9.9	27.8	1.40
1924	(3.08)	5.60	17.2	(2.89)	3.41	9.9	27.1	1.36
1930	3.18	4.11	13.1	2.69	2.53	6.8	19.9	1.00
1940	3.18	7.00	22.3	2.85	3.97	11.3	33.6	1.69
1950	2.85	291	829	2.20	186	409	1238	62
1955	(2.90)	1357	3935	(2.27)	797	1809	5744	289
1960	2.94	1944	5715	2.34	1147	2684	8399	422
1965	(3.10)	2162	6702	2.66	1296	3447	10149	510
1970	(3.10)	3444	10676	(2.60)	1966	5112	15788	793

[1]Until 1920 as of November, from 1930 as of March of following year.

( ) Interpolated or extrapolated figure.

Sources:

Cols. 1 & 4. Hundred Year Statistics, p. 19; Japan Statistical Yearbook 1970, p. 3 (for 1965).

Cols. 2 & 5

1885,1900 Rough estimates, based on scattered data.

1904 E. Igarashi and H. Takahashi, The National Wealth of Japan.

1913-1960 Hundred Year Statistics, pp. 88/89, prices until 1920 for November, then for March of following year.

1965,1970 Japan Real Estate Institute

Table 5

Estimate of Value of Forest Land, 1885-1970

	Forest area million ha. (1)	Forest land price yen per ha (2)	Value of Forest Land bill. yen Census (3)	Value of Forest Land bill. yen Estimated (4)
1885	14.8[1]			0.40
1900	22.4			1.00
1904	(22.0)	52	1.14	
1913	(20.5)	86	1.76	
1920	18.5	245	4.53[2]	
1930	19.9	337	6.71	
1940	20.9	(500)		10.45
1950	22.5	(20000)		450
1955	24.5	85000		2083
1960	24.2	141000		3412
1965	25.7	188000		4832
1970	(27.0)	(300000)		8100

[1] 1890 [2] 1919

( ) Interpolated or extrapolated values

Sources:

Col. 1	1885-1960	Hundred Year Statistics, p. 19
	1965	Japan Statistical Yearbook, 1969, p. 137
Col. 2	1904-1930	Col. 3 divided by Col. 1
	1955-1965	Japan Statistical Yearbook 1970, p. 141; average of price for lumber and for fuelwood and charcoal forests; prices of end of March, for 1955 and 1960, of end of March of following year for 1965 and 1970.
Col. 3	1904	E. Igarashi and H. Takahashi, The National Wealth of Japan, 1906.
	1913-1935	Hundred Year Statistics, pp. 20/21.
Col. 4	1880-1900	Rough estimates
	1940-1970	Col. 1 multiplied by Col. 2

Table 6

Value of Residential, Commercial and Industrial Land[1], 1885-1970

	Census value	Urban land price index	Area index	(2) x (3)	Building costs 1934-36 = 100	Value of buildings	Land/structure ratio	Estimated land value
	bill. yen	1935 = 1.00				bill. yen		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1885			0.82		0.25	1.54	0.40	0.62
1900			0.86		0.52	4.69	0.45	2.10
1904	1.99		(0.86)		0.49	4.67	0.47	2.20
1910	2.68		0.87		0.58	5.95	0.50	3.00
1913			(0.88)		0.60	6.52	0.50	3.27
1920			0.88		1.79	22.34	0.55	12.30
1924	11.98		(0.90)		1.51	19.75	0.66	13.00
1930	16.20	.	0.92		0.97	14.43	0.62	9.00
1935		1.00	1.00	1.00	1.00	16.92	0.59	10.00
1940		1.23	0.07	1.32	2.45	45.51	0.50	22.76
1950		70	1.14	80	.	3500	.	800
1955		336	(1.20)	403	.	6054	0.50	3027
1960		1056	1.26	1330	.	9579	0.70	6705
1965		2345	(1.30)	3049	.	25500	0.85	21675
1970		4583	(1.35)	6187	.	58500	1.00	58500

[1]Private land or buildings only

Sources for Table 6

Col. 1	1904	E. Igarashi and H. Takahashi, op. cit.
	1910	Hundred Year Statistics, p. 22.
	1924	K. Mori, loc. cit.
	1930	Difference between total for urban land and farm fields (S. Shiomi, Kyoto University Economic Review, IX, p. 27) and value of farm land (Nasu, Aspects of Japanese Agriculture, p. 15.)
Col. 2	1935-1970	Japan Real Estate Institute. Average of prices of September and March of following year. It is assumed that prices at end of 1935 were the same as those of September 1936, the base of the index.
Col. 3	1880-1960	Hundred Year Statistics, p. 18. (The term "takuchi" translated erroneously as "residential land" includes commercial and industrial sites; cf. J. Nakamura, Agricultural Production and the Economic Development of Japan 1873-1922, p. 34). Bracketed figures obtained by interpolation or extrapolation.
Col. 5	1885-1940	Ohkawa and Associates, Estimates of Long-Term Economic Statistics of Japan Since 1868, Vol. 8, pp. 158/59; averages of current and following year; 1934/36 = 1.00.
Col. 6	1885-1970	From Table 8, cols. 2 and 3.
Col. 7	1885-1900	Rough estimates
	1904,1910	Col. 8 divided by Col. 6.
	1924-1935 1913,1920 1950-1970	Rough estimates. Figures try to take account of relative movement of land prices and construction costs
Col. 8	1880-1900 1930-1970	Col. 6 times Col. 7 (except 1950 which is a rough estimate).
	1910-1924	Col. 1

Table 7

Estimate of Reproducible Tangible Assets, 1885-1970

bill. yen

	Fixed assets (1)	Inventories (2)	Consumer durables (3)	Total (4)
1885	2.33	0.35	0.05	2.73
1900	7.05	1.00	0.10	8.15
1904	7.61	1.50	0.15	9.26
1913	11.81	3.08	0.22	15.11
1920	42.74	4.48	0.50	47.72
1930	30.43	5.89	1.25	37.57
1940	94.70	17.00	2.50	114.20
1950	6000	900	200	7100
1955	12701	3163	700	16564
1960	23601	6563	1400	31630
1965	57610	11500	3300	72410
1970	130000	23500	8500	162000

Sources:

Col. 1 — Table 8, Col. 1

Col. 2 — Table 10, Col. 6

Col. 3 — Table 11, Col. 4; plus very rough estimates for dates not shown there.

Table 8

Estimate of Stock of Fixed Reproducible Tangible Assets

bill. yen

End of	Total	Buildings		Other Structures	Producer durables	Livestock	Construction in process
		Residential	Other				
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
1885	2.33	0.93	0.61	0.21	0.17	0.41	
1900	7.05	3.20	1.49	0.76	0.72	0.88	
1904	7.61	3.18	1.49	0.77	0.98	1.19	
1913	11.81	4.30	2.22	1.69	2.17	1.43	
1920	42.74	14.28	8.06	7.59	8.88	3.93	
1930	30.43	8.40	6.03	6.82	6.13	3.05	
1940	94.70	26.56	18.97	18.97	22.32	7.90	
1950	6000	2200	1300	1150	1200	150	
1955	12701	2774	3280	2898	3172	341	236
1960	23601	4590	4989	5764	6958	697	603
1965	57610	12000	13500	13000	16500	520	2090
1970	130000	28500	30000	29000	36700	1100	4700

Sources:

1885-1940 Obtained by multiplying Ohkawa's estimates in 1934-36 prices (Estimates of Long-term Economic Statistics of Japan, Vol. 3, p. 134) by price indices (Vol. 8 pp. 158/9 and 165), averaging current and following year's indices.

1950 Cols. 1 and 2 extrapolated from 1955 figures respectively on basis of net capital expenditure and price changes as shown in national accounts. Other columns divided in same proportion as in 1955.

1955,1960 E.P.A. data (Economic Statistics Annual 1970, 277-280).

1965 E.P.A. data for business sectors Op. cit., plus rough estimates for public and non-profit sectors.

1970 Extrapolated on basis of net capital expenditures and price changes as shown in national accounts.

Table 9

Comparison of Perpetual Inventory and Census-type Estimates of Reproducible Fixed Assets, 1905-1935

	All Fixed Reproducible Assets			Residences			Non-residential buildings & structures			Equipment		
	A	B	$\frac{B}{A}$	A	B	$\frac{B}{A}$	A	B	$\frac{B}{A}$	A	B^3	$\frac{B}{A}$
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1905	8.41	8.44	1.00	3.50	3.59	1.03	2.44	1.21	0.50	2.47	3.62	1.47
1910	10.08	10.48	1.04	3.97	4.68	1.18	3.30	1.86	0.56	2.80	3.94	1.41
1913	11.81	9.68	0.82	4.31	5.42	1.26	3.91	1.08	0.28	3.60	3.18	0.88
1924 A^1	40.14	18.98	0.47	12.00	9.27	0.77	15.89	1.07	0.07	12.25	8.63	0.70
1924 B^2		26.57	0.66		13.18	1.10		3.66	0.23		9.61	0.78
1930	30.43	36.19	1.19	8.40	17.91	2.13	12.85	5.16	0.40	9.18	13.12	1.43
1935	36.75	43.19	1.18	9.81	20.34	2.07	15.65	5.87	0.38	11.29	16.98	1.50

A: Perpetual inventory estimate derived from Ohkawa's data (Table 8, or calculated in same way); billion yen

B: Census-type estimate (Supplement to Hundred Year Statistics, p. 14); billion yen

[1] Comparable with 1905-1919

[2] Comparable with 1930-35

[3] Apparently includes livestock, hence also included under A

Table 10

Estimate of Inventories, 1885-1970

Year	Census type estimate of inventories bill. yen (1)	Non-residential buildings and equipment bill. yen (2)	Ratio (3)	Gross national product bill. yen (4)	Ratio (5)	Estimate of inventories bill. yen (6)
1885		0.99		0.80		0.35
1900		2.97		2.57		1.00
1904	1.62[1]	3.24	0.50	3.14	0.52	1.50
1913	3.08	6.08	0.51	5.29	0.58	3.08
1920	4.48	24.53	0.18	16.01	0.28	4.48
1930	5.89	18.98	0.30	14.94	0.40	5.89
1940		60.26		40.78		17.00
1950				3947[2]	0.23	900
1955	3163	8350	0.38	8624	0.37	3163
1960	6563	18811	0.37	15499	0.42	6563
1965	11500	34000	0.34	31787	0.36	11500
1970	23500	85000	0.28	70985	0.33	23500

[1] 1905

[2] Fiscal year ending 3/31/1951

Sources:

Col. 1 1904-30 Supplement to Hundred Year Statistics, p.14

1950 Obtained by deducting increases in inventories during 1951-55 (United Nations, Yearbook of National Statistics, 1957, p. 134) from 1955 value after adjusting roughly for changes in wholesale prices.

1955-60 Hundred Year Statistics, pp. 24/25.

1965-70 Obtained by adding net inventory investment from national accounts to 1960 figure and adjusting for price changes.

Col. 2 Table 8, Cols. 3, 4, and 5.

Col. 4 1880-1940 Ohkawa's revised estimates (to be published in Estimates of Long-Term Economic Statistics of Japan, Vol. I.)

1950-70 E.P.A. figures

Col. 6 Estimated, except for years for which census-type figures are available, on basis of Cols. 3 and 5.

Table 11

Estimate of Value of Stock of Consumer Durables, 1900-1970

Period	Average annual expenditures on consumer durables bill. yen (1)	Expenditures as percent of personal disposable income (2)	Price Index End of Period 1965=100 (3)	Estimated stock End of Period bill. yen (4)
1900-04	0.02	1.1		0.10[1]
1905-09	0.03	1.2		
1910-14	0.05	1.6		0.22[2]
1915-19	0.12	2.2		
1920-24	0.23	2.0		
1925-29	0.26	2.0		1.25[3]
1930-34	0.24	2.2		
1935-39	0.46	2.8		2.00[4]
1940-44	.	.		
1945-49	.	.		
1950-54	.	.	84	700[5]
1955-59	200	2.7	88	1400[6]
1960-64	687	4.7	98	3300[7]
1965-69	1654	5.6	110	
1970	2912	6.6	115	8500

[1]1900 [2]1913 [3]1930 [4]1940 [5]1955 [6]1960 [7]1965

Sources:

Col. 1 1900-1939 Expenditure on "furniture and utensils" (Ohkawa and Associates, op. cit., Vol. 6, pp. 234 ff)

1955-1970 National accounts

Col. 2 Denominators are until 1918 Yamada's estimates of personal consumption and from then through 1929 Yamada's, and for 1930's official figures for personal income. From 1955 on official figures for disposable personal income have been used.

Col. 3 Deflator for expenditures on housing other than rent from national accounts.

Col. 4 Rough estimate based on expenditures, 8-year life (10 years before 1940), straight line depreciation, and price changes (disregarded up to 1930).

Table 12

Estimate of Net Foreign Assets, 1885-1970

bill. yen

	Census type estimate (1)	Cumulated current account balance (2)
1885		- 0.24
1900		- 0.24
1905		- 0.65
1913	- 1.11	- 1.04
1920	2.72[1]	4.00
1930	1.11	1.70
1940		0.99
1950		
1955	199	
1960	370	
1965	- 405	
1970	2070	

[1] 1919

Sources:

Col. 1	1913-1930	Hundred Year Statistics pp. 20/21
	1955-1960	Economic Statistics Annual, 1970, pp 277 ff
	1965-1970	Nippon Keizai Shimbun, 3/10/1969 and 1/8/1972
Col. 2	1880-1940	Y. Yamamoto (to be published in Estimates of Long-Term Economic Statistics of Japan, Vol. 1.)

Table 13

Distribution of National Wealth, 1885-1970

Per cent of Total National Wealth

	Land				Reproducible Tangible Assets							Net foreign assets
	Total	Fields	Forests	Nonagri-cultural	Total	Residential Buildings	Other buildings & structures	Producer durables	Inven-tories	Live-stock	Consumer durables	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1885	48.24	27.03	8.32	12.89	56.75	19.33	17.05	3.53	7.28	8.52	1.04	-4.99
1900	47.30	26.65	6.66	13.99	54.30	21.32	14.99	4.80	6.66	5.86	0.67	-1.60
1913	43.94	23.90	7.01	13.03	60.21	17.13	15.58	8.65	12.27	5.70	0.88	-4.14
1920	43.32	24.88	4.96	13.48	52.30	15.65	17.15	9.73	4.91	4.31	0.55	4.38
1930	44.83	22.76	9.43	12.64	52.77	11.80	18.05	8.61	8.27	4.28	1.76	2.39
1940	34.15	15.43	5.97	12.75	65.29	15.17	21.69	12.76	9.72	4.52	1.43	0.57
1950	24.10	10.74	4.81	8.55	75.90	23.52	26.19	12.83	9.62	1.60	2.14	0.00
1955	37.11	17.50	7.81	11.80	62.15	10.41	24.06	11.90	11.87	1.28	2.63	0.75
1960	35.21	13.83	6.92	14.46	64.02	9.31	23.04	14.11	13.31	1.41	2.84	0.75
1965	32.84	7.71	4.51	20.62	67.55	11.19	26.67	15.39	10.73	0.49	3.08	-0.38
1970	33.04	5.24	3.31	24.49	66.12	11.63	26.00	14.98	9.59	0.45	3.47	0.84

Sources: Tables 2, 7, 8, and 12

Table 14

The Capital-Output Ratio, 1885-1970

	Broad[1] (1)	Inter-mediate[2] (2)	Narrow[3] (3)	Gross national product bill. yen (4)
1885	6.00	3.41	2.19	0.81
1900	5.85	3.18	1.89	2.57
1913	4.74	2.86	2.01	5.29
1920	5.70	2.98	2.06	16.21
1930	4.76	2.51	1.87	14.94
1940	4.29	2.80	2.09	40.78
1950	2.37	1.80	1.18	3947[4]
1955	3.09	1.92	1.52	8624
1960	3.18	2.04	1.65	15499
1965	3.37	2.28	1.80	31787
1970	3.35	2.21	1.71	70985

[1]Total national wealth, including land, consumer durables and net foreign assets.

[2]All reproducible tangible assets.

[3]Nonresidential buildings and structures and equipment plus inventories (including livestock)

[4]Fiscal year ending 3/31/1951

Sources:

Cols. 1 - 3 Table 13

Col. 4 1880-1940 K. Ohkawa (Revised unpublished series) 1880 value obtained by extrapolation from 1885 figure using Ohkawa's national income estimates (Hundred Year Statistics, p. 32).

1950-1970 National Accounts (Hundred Year Statistics p. 136 and Economic Statistics Annual, 1971,

Table 15

National Wealth of Japan

Percent of GNP[1]

	Total	Land				Reproducible Tangible Assets							Net Foreign assets
		Total	Fields	Forests	Nonagri-cultural	Total	Residential buildings	Other buildings & structures	Producer durables	Inven-tories	Live stock	Consumer durables	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
1885	600.4	289.6	162.3	49.9	77.4	340.8	116.1	102.4	21.2	43.7	51.2	6.2	-30.0
1900	584.9	276.6	155.8	39.0	81.8	317.6	124.7	87.7	28.0	39.0	34.3	3.9	- 9.3
1913	474.2	208.3	113.3	33.2	61.8	285.5	81.2	73.9	41.0	58.2	27.0	4.2	-19.6
1920	570.1	246.9	141.8	28.3	76.8	298.2	89.2	97.8	55.5	28.0	24.6	3.1	25.0
1930	476.3	213.5	108.4	44.9	60.2	251.4	56.2	86.0	41.0	39.4	20.4	8.4	11.4
1940	428.9	146.5	66.2	25.6	54.7	280.0	65.1	93.0	54.7	41.7	19.4	6.1	2.4
1950	237.1	57.2	25.5	11.4	20.3	179.9	55.7	62.1	30.4	22.8	3.8	5.1	0
1955	309.3	114.8	54.1	24.2	36.5	192.2	32.2	74.4	36.8	36.7	4.0	8.1	2.3
1960	318.0	112.0	44.0	22.0	46.0	203.6	29.6	73.3	44.9	42.3	4.5	9.0	2.4
1965	337.2	110.7	26.0	15.2	69.5	227.8	37.8	89.9	51.9	36.2	1.6	10.4	-1.3
1970	334.7	110.7	17.6	11.1	82.0	221.2	38.9	87.0	50.1	32.1	1.5	11.6	2.8

[1]The decimals, as well as the last numeral before the comma, of course, have no significance in view of the roughness of most estimates except in Cols. 11-13.